Technology for incontinence hasn't developed that much since ancient Egyptian times

July 31 2018, by Pete Culmer And Sarah King

Credit: AI-generated image (disclaimer)

Today's healthcare is full of technology that would seem like science fiction to our grandparents. But this is far from true in every area: some remain woefully neglected by innovation. Hop in a time machine back to ancient Egypt and you would find recognisable examples of the absorbent pads and catheters which are still a mainstay in the

management of incontinence today.

The earliest known reference to an absorbent pad dates from 4th-century Egypt: the female scientist Hypatia is recorded as having thrown her menstrual rag at a student to ward off his infatuation with her. The pad remained a homemade "product" for many centuries until the 19th century, when manufactured versions of reuseable "antiseptic cotton for absorbing discharges" could be purchased from pharmacies. Disposable pads, first produced by Kotex in 1920, were in widespread use by the late 1930s. Since then, the only major innovation in their design has been the introduction of super absorbent polymers in the 1980s, which have dramatically improved absorbency.

Again, we can thank the Egyptians for the first records of devices like catheters. These were made of bronze, reeds, straws or curled-up palm leaves that would be inserted into the urethra to drain the bladder. Various versions, mostly made of silver, appeared over the following centuries, but these were predominately rigid devices only suitable for intermittent use until the Foley catheter was invented in 1929, which provided a solution for long-term use. Despite many drawbacks, such as an increased likelihood of developing urinary tract infections, Frederic Foley's flexible design is still the most commonly used type of indwelling catheter worldwide.

Research into this area has long been stagnant, perhaps stalled by the persistent stigma surrounding this health condition. Potential researchers who are either unaware of the diverse challenges of incontinence, unwilling to battle for traditionally limited funding in this area, or unable to jump the many barriers necessary to translate research advances into clinical benefit. But finally, there are some promising technological developments in continence care.

Incontinence today

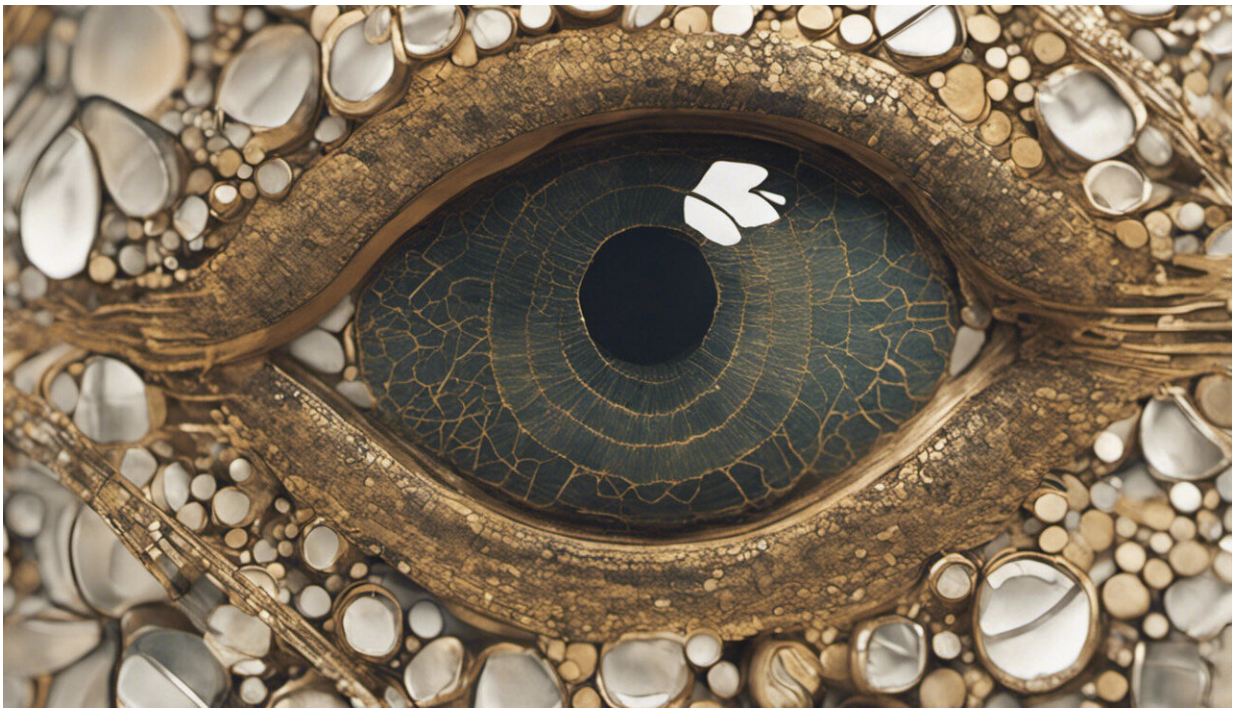
These are needed. Incontinence is a subject people usually feel too embarrassed to talk about, one they sometimes ridicule, and one the research community rarely considers. Yet such is its impact and prevalence that overlooking it will cost us at economic, societal and personal levels.

We know that urinary incontinence effects on average around 28% of females and 10% of males worldwide, while a study in the US in 2009 showed that around 8% of adults endure faecal incontinence. Prevalence increases with age but the condition doesn't only affect adults; about 10% of school-aged children experience urinary incontinence and about 4% faecal incontinence. Together these conditions account for more than 2% of the total UK healthcare budget and urinary incontinence alone cost the US over US$16 billion in 1995.

Living with incontinence long term can lead to social isolation and psychological issues, damaging well-being and creating a vicious cycle of care need. In low and middle-income countries the burden is magnified by limited access to affordable aids such as fluid absorbing materials or catheters and the need for products that do not increase the strain on municipal waste disposal.

Addressing the problem

While many people today are able to deal with their condition independently, they often resort to using homemade solutions because they are plagued by feeling unable to control their condition to the level society expects.



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Meanwhile, technological care has long been at a standstill. For example, the design of stoma and catheter systems have remained fundamentally unchanged since their introduction. This means that the invasive procedures, poor tolerance and infection issues that characterise them continue to obstruct individual's daily lives and strain our healthcare systems.

On top of this, little has been done to address diversity. Appropriate provision for different groups, such as school aged children and young adults, remains comparatively scant. Continence pads are the popular choice despite their issues of bulk, noise, efficacy and disposal – they continue to be tolerated simply because better alternatives haven't been developed.

Faecal incontinence is especially challenging, and here the shortfall runs much deeper. Pads have always been designed primarily for urine so their capacity for containment of faecal matter is profoundly lacking. While anal plugs can be useful, they can't cope with major episodes. To top it all, nothing really tackles people's anxiety over smell.

Promising options

But there is growing recognition and action among scientists to develop new technology for continence care. A number of organisations recently collaborated to publish a white paper on continence technologies, with the aim of inspiring and guiding new engineering science research. Our paper highlights that there is a wealth of opportunity for innovation spanning basic science, materials and coatings, bioengineering, informatics and smart systems.

For instance, tissue engineering provides opportunities for new procedures to repair damaged bladder or pelvic musculature, and new bioengineered coating technologies are beginning to impact on previously stagnant areas such as catheter performance. In basic science, neuromodulation seeks to directly target the nerve pathways which control continence.

Meanwhile, the remarkable advancements in smart technology are ripe for creative application. Such technologies could, for example, be used to create a new generation of agile and personalised data handling software systems which could transform how incontinence is managed and diagnosed. This might make procedures such as urodynamics and anorectal manometry less invasive, an exemplary improvement that undeserved groups such as young adults would benefit from greatly.

Genuine change will require sustained effort and support. Addressing this situation requires attention from government, industry, academia

and healthcare bodies equally. The main thing everyone else can do to help is discuss incontinence more openly so that stigma is addressed through awareness and education.

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